

RESEARCH NOTE

***Philometra chilensis* (Nematoda, Philometridae) affects the fecundity of the red cusk-eel, *Genypterus chilensis* (Guichenot) (Pisces, Ophidiidae) in Chile**

Rosa A. Chávez* and Marcelo E. Oliva

Instituto Investigaciones Oceanológicas, Facultad de Recursos del Mar, Universidad de Antofagasta, P.O. Box 170, Antofagasta, Chile

Abstract

The occurrence of the dracunculoid nematode *Philometra chilensis* Moravec, Chávez et Oliva, 2011 (Philometridae) infecting the ovary of the red cusk-eel, *Genypterus chilensis* (Guichenot), off the Pacific coast of northern Chile is reported. A sample of 266 fish specimens (total body length 34–96 cm) revealed the nematode overall prevalence (April 2007) of this parasite to be 18.5% and the mean intensity of infection 17.9 (SD = 30.8). All infected fish were mature females. The present results suggest that infection by the nematode shows seasonality and coincides with specific reproductive stages of the red cusk-eel, a partial spawner, and as a result the infection can affect the reproductive success of the host.

Keywords

Philometra chilensis, *Genypterus chilensis*, red cusk-eel, partial spawner, Chile

Gonad-infecting parasites of the genus *Philometra* Costa, 1845 may cause considerable damage to the ovary tissue of the fish host, affecting the fish's reproductive success (Moravec and Justine 2009, Perez *et al.* 2009). Only two examples of *Philometra* sp. infections of the gonads of Chilean marine fish have been reported: In the Peruvian sea bass, *Paralabrax humeralis* (Valenciennes) (Serranidae), a close association was found between fish size at first maturity and infection, where only fish larger than those at the first maturity (males and females) were found to be infected (Oliva *et al.* 1992). In the fine flounder, *Paralichthys adspersus* (Steindachner) (Paralichthyidae), both males and females were infected; a relationship between host size and prevalence and mean intensity of infection was not evident, but the values of prevalence and mean intensity were higher in females than in males (Oliva *et al.* 1996).

Two hundred and sixty six specimens of the red cusk-eel *Genypterus chilensis* obtained from local fishermen in Tal Tal (25°23'S, 70°30'W) (northern Chile) during February (males 27, females 62), April (males 36, females 54) and September 2007 (males 35, females 54) were studied. Fish were stored

sand frozen (–18°C) until their examination in the laboratory. After being thawed, each specimen was measured (total body length ± 1 mm) and macroscopically sexed. Gonads were examined for infection by *Philometra chilensis*. Specimens of *P. chilensis* were fixed and preserved in 70% ethanol. The prevalence and mean intensity of infection were calculated according to Bush *et al.* (1997).

Due to the non-normality of intensity data, a Spearman rank correlation was used to test a potential correlation between host total body length and intensity of infection.

The sizes of sampled fish ranged from 34 to 96 cm total body length (mean $\pm$ SD, 63.6 $\pm$ 11.3). Specimens of *Philometra chilensis* were recorded only in ten mature fish females caught in April (see Moravec *et al.* 2011) when the highest proportion of mature females was found (96.4%). Proportion of mature females for February and September was 67.7% and 80.7%, respectively. The intensity of infection ranged from 1 to 99 (mean $\pm$ SD 17.9 $\pm$ 30.8) and was not correlated with host total body length ($r = 0.11$, $n = 10$, $P > 0.5$) suggesting that a cumulative infection does not occur. Few works regarding philometrids include information about quantitative aspects

*Corresponding author: rositachavez@gmail.com

of the infection. The highest previously reported intensity of infection was 49 worms in one fish, when the mean intensity was 5.5 (Perez *et al.* 2009).

All of the infected fish females were mature, and the smallest infected fish was 57 cm in total body length. The highest infection recorded comprised 99 specimens of *P. chilensis* in a fish 75.8 cm in length. The worms harboured eggs and larvae in their uteri. The worms took up almost the entire space of the gonad suggesting for this specimen an almost complete parasitic castration.

The present results suggest that when *P. chilensis* infects the gonads of its host, it can affect the host's fecundity when the number of worms is high. The negative impact of gonad-infecting philometrid nematodes on the reproductive success of their hosts has been suggested by Moravec and Salgado-Maldonado (2007), Moravec *et al.* (2007, 2008) and Perez *et al.* (2009), among others. Oliva *et al.* (1992) found no evidence of histological damage in the gonads of *Paralabrax humeralis* infected by *Philometra* sp., although a moderate leukocytic infiltration was detected.

A close relationship between reproduction of the host and parasitic infection has been suggested by Oliva *et al.* (1992). They indicated that fish that had grown larger than their size at first maturity are likely to be infected, but immature fish and hermaphrodites are not susceptible to infection. Perez *et al.* (2009) suggested synchrony between parasite maturity and reproductive status of the host fish. According to Chong and Gonzalez (2009), the size at first maturity (size when 50% of specimens are mature) for *G. chilensis* is 72.4 cm total body length, but the smallest mature fish was 55 cm in length. In our sample, the smallest fish that was parasitized was a female of 57 cm total body length, suggesting that, as observed in *Paralabrax humeralis*, infection can occur shortly after first maturity.

Infected fish were detected only in April, which is autumn in the southern hemisphere. *Genypterus chilensis* is a partial spawner, and gonad maturity begins in winter, with a spawning period from August to November and a secondary spawning at the beginning of autumn (April) (Chong and Gonzalez 2009). The absence of specimens of *P. chilensis* in fish collected during September, which coincides with the main spawning period, can be explained by the type of reproduction (partial spawning), as was suggested by Perez *et al.* (2009). Because of repetitive spawning, worms can be expelled from the gonads into the water column together with the host's eggs.

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